

VIP STEM Education & Public Engagement (International)

Gambia Project 2019: Report

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Abstract

Vertically Integrated Project: STEM Education & Public Engagement (International)

*The **Vertically Integrated Project: STEM Education & Public Engagement** was created in 2015 by Robert Collins of the School of Education, Faculty of HaSS at the University of Strathclyde. The project's ongoing aims resonate with a fostering of both interdisciplinary approach to learning and the development of enhanced communities of inquiry in the field of STEM Education.*

Within the project students are involved in creating and sustaining STEM Education Clinics in local Scottish schools and public engagement events within their related local communities. In so doing, the project not only develops students' own STEM domain knowledge - and intra-professional and inter-personal skills sets in students - but also seeks to promote the development of STEM literacies acquisition of stakeholder communities in which these clinics are set.

Although the VIP's initial aspirations are towards developing all participants' predicate socio-scientific discourse, it is also known that subsequent associated specialist STEM knowledge and skills set acquisitions this activity promotes are considered a much-valued commodity in the wider political and economic spheres. This is particularly relevant in terms of citizenship attainment of United Nations Sustainable Development Goals (particularly that of SDG 4 Quality Education and SDG 5 Gender Equality) in practice. It is envisaged therefore, that protracted iterations of the project will elicit valuable STEM Literacies' attainment across the longer term.

To this end, domestically in Scotland the current project has taken the form of an evaluative study of STEM Education enhancement within local community schools identified in the Scottish Index of Multiple Deprivation (SIMD) areas 0-20 and 0-40. Emphasis here was placed on the investigation of participant argumentation within STEM through use of the Modified Toulmin Argument Pattern (ModTAP) Analytical Framework (Foong & Daniel, 2010). Crucially, the VIP is timely in supporting the national drive towards bridging attainment gap and gender imbalance in STEM Education study, is aligned to creativity regarding STEM study in Scottish schools and chimes with precepts highlighted in the Scottish Government's recent National Improvement Framework.

With this in mind, in Academic Session 2018-19 it was decided that the early successes of the domestic project might be usefully replicated internationally. To this end a small exploratory case study in Summer 2018-19 in Gambia was able to identify that there may indeed be scope for the VIP to extend internationally within Gambian schools. This successful pilot study was then followed up in Academic Session 2018-19 with a view to working toward a Memorandum of Understanding with the Ministry of Education in Gambia towards introducing the programme, which had already been run so successfully in Scotland, in the near future.

This report then outlines the process of investigation, scope for furthering student study internationally within the VIP: STEM Education & Public Engagement and the appetite for its adoption as a key STEM pedagogical driver in Gambian schools moving forward.

1. Introduction

The Gambia Project 2019 is one strand of Strathclyde University's Vertically Integrated Projects. VIPs aim to put interdisciplinary pedagogy at the heart of the Strathclyde University student experience. The VIP methodology brings together groups of students from multiple disciplines and from different academic stages; undergraduates through to PhD from all courses. This allows these students to be involved in long term projects throughout their academic journey, examining cross cutting themes and identifying innovative solutions.

In June 2017 and under the guidance of Robert Collins from the School of Education, two teaching students undertook a scoping exercise in the Gambia to consider the possibility of developing a student education project which could run alongside the engineering projects. By October 2017 planning had begun for a second iteration of the project which would progress the earlier project's work. Key to the next stage was developing a sustainable partnership between Strathclyde University School of Education and Gambia College and in doing so establish a Memorandum of Understanding between the two institutions. In addition, the UN Sustainable Development Goals now underpin the aims of the project and GCRF-GE funding for The Gambia Project 2019 was awarded.

Principal Investigator Robert Collins enlisted Jane Catlin, Teaching Associate, School of Education, as field trip lead and a PhD researcher from the School of Governance and Public Policy was brought to the project with expertise in community owned solar energy technology. Two final year undergraduate primary teaching students were selected to participate in the project as part of their student experience. The students were part funded from Strathclyde University's Alumni Fund. In March 2019 the Gambia Project was promoted across Strathclyde University campus and a promotional event allowed students, staff and friends the opportunity to learn about the project and

participate in discussions about the University's VIP approach. The field trip took place between 25th March and 6th April 2019.

2. Literature Review: Education in the Gambia

There is a paucity of research relating to education in The Gambia, however that said, the following retrieved articles cover a range of pertinent issues and have been helpful in illuminating the Gambian context and the complexities of working transnationally.

Michele Schweisfurth's, *Democracy and Teacher Education: negotiating practice in The Gambia* details a research and collaborative activity undertaken between 2000 and 2010 at Gambia College. The research sought to examine students' and lecturers' views on democracy and education through the delivery of a series of workshops on these themes, an evaluation process monitored the impact of these discussions on student and lecturer attitudes and practice. The report sets out both lecturers' and students' perceptions and conceptualisations of democracy in education and reflects on how this shapes the student/lecturer relationships and teaching methodologies. In addition to the insight this literature provided it is important for the success of our own project to take account of Schweisfurth's thoughts on the 'effectiveness and ethics of interventionist projects in developing countries'. There is a clear emphasis on importance of ensuring that proposed outcomes are actually what the participants desired. In this regard Schweisfurth's methodology and approach to project development provides useful and apposite guidance on collaborative partnerships between western countries and the global south. Schweisfurth attends in detail to the importance of agency for all parties. Despite encountering practical difficulties along the way, woven within the process was a very genuine

commitment to conducting the research with this underpinning value. This is something the Gambia Project should aspire to.

In addition to the Democracy in Education project Schweisfurth has written a number of articles on 'Learner-Centred Education' (LCE) in the Global South citing data from the Gambia. These are noteworthy as research evidence as to which pedagogical interventions might result in the positive, impactful outcomes. In *Learner-centred Education in International Perspective: Whose pedagogy for whose development?* (Schweisfurth, 2013) Schweisfurth posits that careful consideration needs to be made as to whether there are global pedagogical approaches that will suit all classrooms regardless of context. She poses the question of how well LCE, which is the preferred model in western countries, transfer to different cultural, social, and economic contexts. Schweisfurth's notes the number of failed attempts to intervene in teacher methodology with LCE approaches in developing countries, and presents some of the factors that might explain this phenomena. We need to be thinking carefully about which teaching and learning collaborations are most likely to be impactful within Gambian educational contexts and provide learning for all participants.

Three research articles were retrieved which focus on girls' education in the Gambia. Manion states that gender equality is now 'a highly embedded norm' (Manion, 2012) as part of aid recipient countries' policy development. *Closing the education gender gap: estimating the impact of girls' scholarship program in The Gambia* (Gajigo, 2014) is a study set up to analyse Gambian girls' school attendance figures during the staged removal of school fees (FEA). The report findings demonstrate positive trends as a direct outcome to this initiative. During our own discussions with lecturers, teachers, and the Minister for Lower and Basic Education it was very clear that gender equality was indeed high on the agenda at all levels. It was also observed as part of classroom teaching practice and teacher/pupil interactions (as will be referred to further on in this report). However, according to Manion in *Power Knowledge and Politics: Exploring the contested terrain of girl focussed interventions at the national launch of the United Nations Girls' Education Initiative in the Gambia* (Manion, 2012)

caution is advised as to the reality of what impact is being actually being achieved. Manion presents a powerful case for taking cognisance of the complexities of the gender issues in The Gambia, and the importance of understanding the social, attitudinal and cultural barriers to the gender equality that said policies point to.

Some of these contested areas are discussed in *The Prospects and Challenges of Reforming the World Bank's Approach to Gender and Education: Exploring the Value of the Capability Policy Model in The Gambia* (Manion, Menashy, 2012). Here the authors examines theoretical frameworks being used for international education policy development. She strongly advocates for a 'human capability' model, as opposed to 'human capital' model for aid interventions, as a matter of social justice. A 'human capability' approach conceptualises education as having a wide range of benefits such as wellbeing, quality of life, and freedom. Manion and Menashy critique the World Bank's 'human capital' approach which focuses on an economic argument for education and the purpose of education as solely a means to an economic end. This fails to recognise the intrinsic value of education and the wide range of motivations for people engaging in educational activities. However, the 'human capital' theory dominates education policy globally. This economic and market driven approach to aid, to which nearly all the World Bank policies adhere, is criticised as not delivering bottom-up equality i.e. failing to achieve solutions which arrive at the necessary benefits to individuals and their communities in most need. A human capability model addresses the need for 'an expanded vision of the role of education as a tool for egalitarian social transformation' (Manion, Menashy, 2012, p234) and highlights the risks of economic only arguments and their propensity for ultimately maintaining the status quo. For example, policies such as FEA strive to achieve gender equality, however whilst girls' school attendance did increase under this policy, the propensity for continued greater *investment* in boys' education is because this investment is still seen as having a better economic return.

Whilst the Gambia Project 2019 does not specifically focus solely on girls' STEM education the literature review provides important learning for us on the pressing issues for the education in the

Gambia. This knowledge and understanding will help guide any future development plans. There was no research identified on the impact of the installation of solar energy in schools in the Gambia. However, it is highly significant that the Gambia is about to undergo ambitious and transformational change as the country gears up to provide solar energy for 1,100 schools. This has been made possible with financial support from the European Investment Bank (EIB), £91m and £30.6 m from the World Bank, with a further £35m grant from the EU. In addition to the 1,100 schools all health facilities will be installed with Solar panels and battery technology (Minster for Lower and Basic Education, April 2019; Shrestha, P., 2019). The unprecedented scale of investment in renewable energy for public education makes this plan unique in Africa if not the world (Shrestha 2019). Therefore, it would seem the impact of electrification on schools and teaching and learning in the Gambia specifically, could be a very timely and an area worthy of further investigation.

The Education for All 2015 National Review Report: Gambia. Ministry of Basic and Secondary Education and Gambian National Commission for UNESCO summarises the data set for education monitored between 2000 and 2014. The report includes the national priorities for addressing the EFA beyond 2015. This document is attached as Appendix 2.

3. The Gambia Field Trip March 25th- April 5th 2019

Gambia College

Gambia College is located in the town of Brikama approximately 30 miles south of the capital city of Banjul. It provides all Initial Teacher Education for the Gambia. We were warmly welcomed by the senior management and staff at the college. The College Principal, took a close personal interest both prior to our visit (through email communication) and when we arrived. He ensured that we were introduced to a wide range of relevant teaching staff from across the campus. We were delighted to complete the first stage of the MOU (which has now been fully ratified by both institutions) and presented a traditional Scottish Quaich as gesture of international friendship. The Principal was very positive about our prospective partnership and he took us on a tour of the college campus including their on-site nursery and Early Years provision. Thereafter the Vice Principal, was instrumental in arranging introductions for the VIP project team to a number of schools in the surrounding area. She was able to facilitate a meeting for us at the Ministry of Education.

We were also introduced to the Head of School at Gambia College. One of the priorities he raised with us was the skills teachers will require to meet the needs of children with Additional Support Needs. The Gambia is moving towards an inclusive approach for all children (as with LCE, Schweisfurst's 'globalisation' of education policy). He is keen to improve the teacher's capacity, however there is a lack of in country training for teachers of deaf and blind children. It was evident in discussion that he would be interested in any support available from Strathclyde University to assist and is keen to ensure that, as he put it, 'children with ASN are not left behind'.

A lecturer in Mathematics at Gambia College, facilitated two group sessions between the VIP team and a group of qualified Gambian teachers. All of whom were in the process of undertaking their Advanced Diploma in Teaching qualification. The purpose of the session was to allow teachers to

describe what they see as being main challenges for their teaching practice, and comment on their personal experience from the field. Approximately 40 teachers participated in these discussions. Whilst problems with resources, transport, class sizes of 60-70, and split shifts were all raised, the 'language barrier' was the most commonly recurring theme. It is not unusual for teachers in the Gambia to be posted to areas where they do not speak the same language as their host community (there are 10 distinctive languages spoken in the Gambia, the three main languages are Mandingo, Pulaar and Wolof). Early Years stages 1-3 are taught in the local language, there after all school education is conducted in English. These factors combined present a complex myriad of linguistic obstacles for teachers to overcome. One Advance Diploma teacher described very enthusiastically how she used drama in her classroom as a way of addressing these communication difficulties.

Gambia College campus is currently being extended with a newly built teaching block. This will provide much needed additional classroom and office accommodation. The building project is being funded with assistance from The Netherlands. The Gambia's population is growing so the need for teachers is urgent.

The Ministry of Basic and Lower Education

We were then accompanied to a meeting at the Ministry for Basic and Lower Education in Banjul. The Minister for Education was pleased to hear that we had agreed an MOU with Gambia College. He would also be very interested in establishing an MOU with the Strathclyde University to support further engagement and knowledge exchange, specifically as regards STEM Education. He explained that they were currently working on the plans to solarise 1100 schools, a major development for rural schools in particular, most of which are in communities which are entirely off grid.

School Visits and Observations

Observations of teaching and learning were undertaken in 4 schools at 3 different stages; Early Years, Lower Basic, and Upper and Senior Secondary School. Observing practice at first hand created a primary context in which to considering Schweisfurt's thoughts on LCE and TCE and the globalisation of pedagogical practice.

Pupil song and chanting was nearly always in evidence and audible in the Gambian basic and lower classrooms. Limited access to physical resources dictates that the teacher adopts a pedagogical approach that by necessity is largely oral and aural, and this is striking feature in comparison to what might be seen in a Scottish primary classroom. Call and response, and repetition/recall were strategies that were routinely used. In all of the classes we visited the teacher took a very central role in directing the lesson content from the front of the class. This aligns with Schweisfurth's contention that many aid dependant countries use TCE methodologies as they are what is best suited to contexts with high pupil/teacher ratios and low practical resources. There was a strong impression that the use of unison voices came across as a powerful way to support pupil participation and engagement in Gambian classrooms. It was interesting to consider on how quiet a Scottish school might seem in comparison.

Showing us round The Early Years School at Gambia College it was explained that facility has been set up as a model of best practice in the country and the small classes and readily available basic materials such as pens pencils paper etc. were not typical of most Gambian schools. The EY provision at the College benefits from funding from The Netherlands and staff are able to expand and enhance the experience for pupils. Class sizes are around 30 pupils and the accommodation and resources were good. EY children all received 30 mins play based learning, a similar model to the play pedagogy currently being promoted in Scottish primary schools. We observed a member of EY staff teaching the children a phonics lesson in blending letter sounds, he used visual aids and to support pupils'

conceptual understanding. Pupils in this class also had access to iPads which were used to support reading. There were also a variety of educational games apps for children to use that were similar to those that might be seen in any Scottish classroom. The Head Teacher for EY described how they used a thematic approach to teaching and learning with all subjects planned for that day being taught through the chosen topic. Playground equipment and a garden provided the pupils with an active outdoor play space.

We were invited to observe an NQT's lesson on alphabetic ordering of words from a text on the board. This teacher's use of high order and effective questioning techniques fostered collaborative thinking and peer support using a social constructivist approach to problem solving, and approach which, it was surmised, could easily resonate with the VIP's own domestic pedagogy. Whilst very much a teacher led lesson the interactions were highly constructivist. This teacher also actively sought out participation from girls 'I want a girl to answer', indicating that the policy of promoting girls' education was being proactively acted on in the field of STEM Education – another similarity with the existing VIP. This lesson was in many ways very indistinguishable from teacher methodologies that might be used in a Scottish classroom.

Gambia Horse and Donkey Trust

Gambia Horse and Donkey Trust (GHDT) is a charitable organisation which supports animal welfare and education for local communities. GHDT employ an out-reach worker who works with the staff and children at local primary schools. A future project based within this triangle of institutions could allow for a fruitful collaboration between these partners. In addition the DHT at one LBS, spoke highly of their pupils' environmental group that would be interested in participating in any future STEM

Education projects. In addition there is an extensive kitchen garden which is supported by a group of enthusiastic teaching volunteers.

The GHDT is reliant on teams of volunteers to work with local staff. The centre at Makasutu regularly host student vets from the UK as part of their project. GHDT is a long standing and highly respected charitable organisation in the Gambia which provides vital assistance and education to farmers to improve both animal welfare and the lives of the families the horses and donkeys support and is keen to support any work with Strathclyde University in the Gambia. We were able to inspect the volunteer and visitor accommodation at Makasutu to check its suitability for hosting SU students in subsequent trips.

School Visits and Solar Energy

We also visited an Upper and Senior Secondary School has 2206 pupils. The Head Teacher showed us the school's computer lab which runs from solar panels funded by the World Bank. The school was one of 4 schools identified by The Ministry of Education for solar technology. The electrification has enabled all of the senior students at this school to have access to the internet, albeit it within the limitations of timetabling for the large student cohort. When asked about maintenance the HT reported that they had been able to deal with any minor issues with the technology. It had been in place for two years and had been running smoothly without any major issues.

The Lower Basic School visited had a solar panel which was installed to run the school water pump, however, this was not operational and the school has no running water and no alternative power

source. The fabric of this school was very poor; the roof of an office had blown away during a hurricane, flimsy roof and canopy structures were at risk of further damage by adverse weather, and there was only one rudimentary toilet facility for the whole school. The Head Teacher and DHT described how difficult the working conditions were at this school for staff and pupils.

Within a small geographical area access to power for school education is either limited or non-existent. There is not yet adequate funding, infrastructure and the available skilled workforce in country to maintain consistent and reliable power supplies for schools. The Gambia will continue to be dependent on aid and donors to tackle the enormous challenges for the education system. The plan to solarise 1,1000 schools will be a highly significant step in the process to bring about improvements.

Further work to assessing more directly the impact of electrification in schools would require clarity as to which specific aspects of educational practice could be monitored. Further discussions with staff could reveal more about whether the access to power is allowing for curriculum development, changing pedagogy, improving staff/pupil morale, or providing other community benefits.

4. Summary

It was very evident that teachers in Gambian schools were working with little in the way of physical resources and amenities e.g. overcrowded classrooms, lack of basic furniture, books and materials, as well as having very limited access to sanitation facilities, water and power supplies.

Discussions with professionals across the education system suggested there was genuine enthusiasm and interest for sharing expertise with Strathclyde University and about the prospect of a continued partnership. The Gambian teaching profession were open and positive in allowing us to experience as much as possible about school life in the Gambia.

It was not deemed appropriate during the 2019 field trip for the participating students to take classes. Now that links between institutions have been more clearly established and with reference to the recommendations in the 2017 report, shared practice between Scottish and Gambian teachers is now something that future projects can hopefully focus on. These teaching partnerships will need to be planned in advance and host schools and their teachers need to have agency in formulating the activities that would best suit the context. Moreover attention must be paid to children's sensitisation to unfamiliar teachers if students are to be working in local classrooms.

SU students working with peers at Gambia College could provide a valuable and suitable context for students to undertake the collaborative activities and reflective conversations about teaching practice. Common ground between students to discuss areas of practice might be found in some of the following; STEM, EY play pedagogy, teachers' use of questioning in the classroom/Formative Assessment, literacy, sustainability and environmental education.

It is envisaged that for session 2019/20, the Gambia Project might be embedded as an accredited international arm of the existing VIP STEM Education & Public Engagement with the students able to achieve credits through their work. Students from the School of Education BAPE Year 2 and Year 4 the

proposed target groups. Potential avenues of funding need to be identified early in the session for a further field trip by Easter 2020.

Strathclyde University's commitment to ongoing development of the Gambia Project is strong. Our links with Gambia College and the Gambia Ministry of Education have now been solidified through a standing MOU. Finally, this small African nation is about to embark on a remarkable commitment to investing in renewable energies that Scotland, another small nation state, should be looking to learn from. Monitoring these interventions and their impact, could tell the rest of the world a great deal about the relationship between technology and teaching and learning, and how we can build a sustainable future that delivers the equity that the Gambian children deserve.

6. References

